

1. A magnetoresistive effect element comprising:

a laminated body including a magnetosensitive layer a magnetizing direction of which is changed by an external magnetic field and constituted such that a current is made to
5 flow in a direction orthogonal to a laminated layer face thereof;

an annular magnetic layer arranged at a side of one face of the laminated body to constitute an axial direction by a direction along the laminated layer face; and

10 a plurality of lead wires penetrating said annular magnetic layer.

2. The magnetoresistive effect element according to Claim 1, wherein the laminated body is electrically connected
15 to the annular magnetic layer.

3. The magnetoresistive effect element according to Claim 1, wherein the plurality of lead wires are extended in parallel with each other at a region penetrating the annular
20 magnetic layer.

4. The magnetoresistive effect element according to Claim 1, wherein a portion of the annular magnetic layer serves also as the magnetosensitive layer.

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5. The magnetoresistive effect element according to Claim 1, wherein the magnetosensitive layer is provided separately from the annular magnetic layer and the magnetosensitive layer and the annular magnetic layer are brought into a magnetic exchange coupling.

6. The magnetoresistive effect element according to Claim 5, wherein a nonmagnetic conductive layer is provided between the magnetosensitive layer and the annular magnetic layer to bring the magnetosensitive layer and the annular magnetic layer into an antiferromagnetic coupling.

7. The magnetoresistive effect element according to Claim 1, wherein the magnetosensitive layer is provided with a coercive force larger than a coercive force of the annular magnetic layer.

8. The magnetoresistive effect element according to Claim 1, wherein the laminated body comprising:
a nonmagnetic layer;
a first magnetic layer laminated to one side of the nonmagnetic layer and having a fixed magnetizing direction; and
a second magnetic layer laminated to a side of the nonmagnetic layer opposed to the first magnetic layer and functioning as the magnetosensitive layer;

wherein information is detected based on a current flowing in the laminated body.

9. The magnetoresistive effect element according to
5 Claim 8, wherein the first magnetic layer is provided with a coercive force larger than a coercive force of the second magnetic layer.

10. The magnetoresistive effect element according to
10 Claim 8, wherein an antiferromagnetic third magnetic layer which is brought into an exchange coupling with the first magnetic layer is arranged on a side of the first magnetic layer opposed to the nonmagnetic layer.

15 11. The magnetoresistive effect element according to Claim 8, wherein a fourth magnetic layer brought into an exchange coupling with the first magnetic layer is arranged between the first magnetic layer and the nonmagnetic layer.

20 12. The magnetoresistive effect element according to Claim 11, wherein a second nonmagnetic conductive layer for bringing the first magnetic layer and the fourth magnetic layer into an antiferromagnetic coupling is arranged between the first magnetic layer and the fourth magnetic layer.

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13. The magnetoresistive effect element according to Claim 8, wherein the nonmagnetic layer comprises an insulating layer capable of bringing about a tunnel effect.

5 14. A magnetic memory device comprising:
a plurality of first write lines;
a plurality of second write lines extended to
respectively intersect with the plurality of first write lines;
and

10 a plurality of magnetoresistive effect elements each
having a laminated body including a magnetosensitive layer a
magnetizing direction of which is changed by an external
magnetic field and constituted such that a current flows in a
direction orthogonal to a laminated layer face thereof, and a
15 annular magnetic layer arranged to a side of one face of the
laminated body such that an axial direction thereof is
constituted by a direction along the laminated layer face and
constituted to be penetrated by the first write line and the
second write line.

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15. The magnetic memory device according to Claim 14,
wherein the laminated body is electrically connected to the
annular magnetic layer.

25 16. The magnetic memory device according to Claim 14,

wherein the first write line and the second write line are extended in parallel with each other at a region penetrating the annular magnetic layer.

5 17. The magnetic memory device according to Claim 14, wherein a portion of the annular magnetic layer serves also as the magnetosensitive layer.

10 18. The magnetic memory device according to Claim 14, wherein the magnetosensitive layer is provided separately from the annular magnetic layer and the magnetosensitive layer and the annular magnetic layer are brought into a magnetic exchange coupling.

15 19. The magnetic memory device according to Claim 18, wherein an interval between the magnetosensitive layer and the annular magnetic layer is arranged with a nonmagnetic conductive layer for bringing the magnetosensitive layer and the annular magnetic layer into an antiferromagnetic coupling.

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20. The magnetic memory device according to Claim 14, wherein the laminated body comprising:

 a nonmagnetic layer;

25 a first magnetic layer laminated to one side of the nonmagnetic layer and having a fixed magnetizing direction; and

a second magnetic layer laminated to a side of the nonmagnetic layer opposed to the first magnetic layer and functioning as the magnetosensitive layer;

wherein information is detected based on a current
5 flowing in the laminated body.

21. The magnetic memory device according to Claim 20, wherein the second magnetic layer is provided with a coercive force larger than a coercive force of the annular magnetic
10 layer.

22. The magnetic memory device according to Claim 20, wherein the first magnetic layer is provided with a coercive force larger than a coercive force of the second magnetic layer.
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23. The magnetic memory device according to Claim 20, wherein an antiferromagnetic third magnetic layer brought into an exchange coupling with the first magnetic layer is arranged on a side of the first magnetic layer opposed to the nonmagnetic
20 layer.

24. The magnetic memory device according to Claim 20, wherein a fourth magnetic layer brought into an exchange coupling with the first magnetic layer is arranged between the
25 first magnetic layer and the nonmagnetic layer.

25. The magnetic memory device according to Claim 24,
wherein a second nonmagnetic conductive layer for bringing the
first magnetic layer and the fourth magnetic layer into an
antiferromagnetic coupling is arranged between the first
5 magnetic layer and the fourth magnetic layer.

26. The magnetic memory device according to Claim 20,
wherein the nonmagnetic layer comprises an insulating layer
capable of bringing about a tunnel effect.
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27. The magnetic memory device according to Claim 16,
wherein parallel portions of the first and the second write
lines extended in parallel with each other are formed by bending
at least one of the first and the second write lines.
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28. The magnetic memory device according to Claim 27,
wherein one of the first and the second write lines is extended
in a shape of a rectangular wave, other thereof is extended in
a linear shape and a rise portion and a fall portion of the shape
20 of the rectangular wave correspond with the parallel portions.

29. The magnetic memory device according to Claim 27,
wherein the bent first or second write line is constituted to
include two layer portions connected with each other via an
25 interlayer connecting layer comprising a conductive material.

30. The magnetic memory device according to Claim 14,
further comprising:

a plurality of read lines for making a read current flow
5 in a direction orthogonal to the laminated layer face of the
laminated body in each of the magnetoresistive effect elements;
wherein information is read based on a current flowing
in the laminated body.

10 31. A method of fabricating a magnetic main body device
comprising a write line group including a plurality of first
write lines and a plurality of second write lines extended to
respectively intersect with the plurality of first write lines;
and a magnetoresistive effect element having a laminated body
15 including a magnetosensitive layer a magnetizing direction of
which is changed by an external magnetic field, said method
comprising the steps of:

forming the first write line on a first insulating layer;
forming a second insulating layer to cover a portion of
20 the first write line and a surrounding thereof;

forming the second write line on the second insulating
layer; and

self-adjustingly forming a laminated layer structure in
which the first and the second write lines are extended in
25 parallel with each other by interposing the insulating layer

by selectively etching to remove the second insulating layer and the first write line by constituting a mask by the second write line.

5 32. The method of fabricating a magnetic memory device according to Claim 31, wherein the step of forming the first write line comprises:

 a step of forming a portion of the first write line which is not in parallel with the second write line;

10 a step of forming a third insulating layer to cover a portion of the first write line which is not in parallel with the second write line and a surrounding thereof;

 a step of forming an interlayer conductive layer by forming a via hole connected to an end portion of the portion
15 of the first write line which is not in parallel with the second write line at the third insulating layer and embedding a conductive material into the via hole; and

 a step of forming a portion of the first write line which is included in the laminated layer structure and in parallel
20 with the second write line on the third insulating layer such that an end portion thereof is connected to an upper portion of the interlayer conductive layer;

 wherein the first write line is bent to form in a laminating direction by connecting the portion of the first
25 write line which is not in parallel with the second write line

and the portion in parallel therewith by the interlayer
conductive layer.

33. The method of fabricating a magnetic memory device
5 according to Claim 32, wherein when the magnetic memory device
further comprises a annular magnetic layer surrounding at least
a portion of portions of the first write line and the second
write line in parallel with each other in a annular shape, said
method further comprising:
- 10 a step of selectively forming a first annular magnetic
layer portion at a region in correspondence with at least the
portion of the portions of the first and the second write lines
in parallel with each other above the third insulating layer;
- a step of forming the laminated layer structure at the
15 portions of the first and the second write lines in parallel
with each other and thereafter forming a fourth insulating layer
to cover a side face and an upper face of the laminated layer
structure; and
- a step of forming the annular magnetic layer comprising
20 the first and a second annular magnetic layer portion by
selectively covering a side face and an upper face of the fourth
insulating layer and forming the second annular magnetic layer
portion to connect to the first annular magnetic layer portion.

- 25 34. The magnetoresistive effect element according to

Claim 1, wherein at an interface of the annular magnetic layer and the laminated body, an area of the annular magnetic layer is larger than that of the laminated body.